### INTERNATIONAL CALENDAR

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<td>May 27–June 1</td>
<td>Amsterdam, Netherlands</td>
<td>24th World Congress of the Federation Intern. de Medecine Sportive</td>
<td>Inf.: Congress Sec., FIMS, c/o Organisatie Amsterdamsk, Twentheplein 12, 1087 GD Amsterdam, Netherlands</td>
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<td>June 4–8</td>
<td>Helsinki, Finland</td>
<td>Nordic Congress on Orthopedics</td>
<td>Inf.: Nordisk Ortopedisk Forening, Prof. P. Rokkanen, Tapiola, Finland, Tapiolinkatu 5, 00260 Helsinki, Finland</td>
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<td>June 13–14</td>
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<td>June 15–20</td>
<td>Washington D.C., USA</td>
<td>13th Annual RESNA conf. on Rehabilitation, Technology</td>
<td>Inf.: RESNA, Asst. for the Advancement of Rehab. Technology, Washington, D.C., 20036 USA</td>
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<td>June 19–23</td>
<td>Charlottetown, Prince Edw., Que., Canada</td>
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<td>June 24–29</td>
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<td>25th Intern. Conf. on Social Welfare on The Human Dimension of Local Development: 'Accepting the Challenge'</td>
<td>Inf.: ICWS—General Sec., Kundnagar 1/29 A-1060 Wien, Austria</td>
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<td>Aug. 2–8</td>
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<td>Inf.: Jon Helge Hansen, Inst. for mannsf. terapi, Postbox 203, 9001 Tromso, Norway</td>
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<td>Sept. 12–14</td>
<td>Dubrovnik, Yugoslavia</td>
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<td>Inf.: Prof. Ivan Jazić, Lovrenčka 109, 40000 Zagreb, Yugoslavia</td>
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<td>Sept. 12–15</td>
<td>Karlsruhe, West Germany</td>
<td>REHAB'95, the 6th Intern. Exhibition and Rehabilitation Aid and Congress for Further Education</td>
<td>Inf.: Christa Hennemann, P.O. Box 100, 533 D-6900 Dortmnd</td>
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The functional recovery of stroke

During the period in which this intervention-study took place, thirty months after the stroke, patients were included in the study—about 3% of the total stroke population admitted to the Neurology Ward of the Free University Hospital. Thus, the study included a small and relatively homogeneous subpopulation of the total population of stroke patients, which was well defined, although not on relevant parameters. Their age ranged from 40 to 77 years. Five of them had suffered a stroke in the right hemisphere and two in the left.

Treatment condition
Both N.D.T. and Brunstrom method are commonly applied forms of physical therapy in the rehabilitation of stroke patients and have been described in detail in the literature. In this study, the approach used in the N.D.T. condition adhered strictly to the principles presented by Davies (3) and the approach used in the Brunstrom condition to the principles formulated by Brunstrom (4). Facilities, or inhibitory techniques and instructions for motor behaviour were specified accordingly, as well as the positioning and moving of the patient in bed and in the chair, etc., lying and sitting positions, sitting up, transfers, etc. Every member of the team of physical therapists, occupational therapists and nurses, acted in accordance with a detailed written protocol based on the abovementioned principles of the therapists involved. Both methods were applied by specially trained therapists.

Assessment
The relative efficacy of the two contrasting forms of physical therapy was evaluated in terms of disability (functional recovery) and valid assessment instruments. Each week, upper limb function, walking disability, and ADL were measured. In addition, occurrence of depressive mood and feelings were measured.

Upper limb function. After reviewing twenty-seven tests for upper limb function, the Action Research Arm Test (ARA-14) was chosen because of its high reliability, high validity, and practical applicability. It measures a range of more than 80 items involving several hand grips and arm movements. Hand grips (i.e., grasp, grip, lateral prehension, finger-to-finger opposition) are evaluated and the patient is made to move objects with different shapes, sizes and weights to various places on a specially designed wooden table (12). In addition, the hand is moved to the mouth and to the top and the back of the head. In this study, two tasks were included in the fourth subset without changing the total score, i.e., an object on the table had to be pushed forward and the arm had to be stretched above the head. In this way, the ARA test is made more sensitive for those stroke patients who hardly show any functional recovery.

The movement assessment is scored on a four-point scale: 0 = no movement; 1 = the movement is partially performed; 2 = the movement task is completed, but ‘abor

tory’; 3 = the movement is normally performed. In this study, a ‘partial’ movement was allowed in one case only, but this was able to either lift the hand with the object off the table (subtasks 1, 2 and 3), or to push the object forwards/lift the hand off the table (subtask 4). A ‘normal’ performance implied that the patient complet

ted the task both within a certain time-limit and without losing contact with the back of the chair. The maximum score was 98, which was the standard deviation.

The ARA test consists of nineteen movement tasks which are divided into four domains (i.e., grasp, grip, pinch and gross movement). The maximum score is fifty-seven points. In each domain the items are arranged in order of difficulty, according to the Grinnals scale (13). This last score makes this assessment instrument particularly easy and quick to apply. The high inter-rater and test-retest reliability (0.98 and 0.99) found by Dyne (14), was reproduced here and the intra-rater reliability 0.99 as well as the validity (0.94) were ascertained. In these evaluations, Spearman Rank Correlation Coefficients were used. The validity was established by correlating the ARA-test with the Sollerman-test (12).

Walking disability. Walking disability was assessed by measuring walking velocity and by performing gait-analysis (e.g., 3, 20). The patients walked (if possible) a distance of eight metres. Video-recordings were made in the sagittal plane by a video-camera moving on a trolley. If necessary, the patients were guided by a physiotherapist. The walking disa

bility was recorded in two conditions: i.e., the patient was asked first ‘to walk as fast as possible’, and then to ‘walk as comfortably as possible’. Measurement of walking velocity and gait-analysis were performed in both conditions on a trajectory of five metres. Gait-analysis focused on time parameters such as step-time, swing-time, stance-time, and time-symmetry (i.e., ratio of the swing times of both legs). Furthermore, step fre

cuency, cadence, and stride-length were measured. The video-tapes were analysed by counting the individual frames using a Panasonic AG-200 video recorder and converting the results into seconds. Before the intervention study start

ed, the inter and intra-rater reliability as well as the test-re

test reliability were assessed. The reliability coefficients were 0.97 or higher for speed of walking and 0.78 or higher for the time parameters studied (Spearman Rank Correlation Coefficients).

Activities of daily living. The modified Barthel Index was used for the evaluation of ADL (e.g., 7, 11). The index includes feeding, bathing, personal toilet, dressing, bowel and bladder control, transferring and walking. The index is divided in three domains: self-care, toilet and stairs climbing. In the literature, this assessment instrument has been described as a reliable test (11). No special tests to evaluate the reliability and validity of the modified Barthel Index were invoked during the research reported. Depressive mood and feelings. Occurrence of depressive mood and feelings was measured with the VIPROSEM test, a Dutch version of the Depression Adjective Checklist (23). The test includes thirty-four adjectives which are divided in two categories, i.e., euphoric or euphoric states of mood, such as ’sad’ or ’fine’. Van Ronkom & Vitters (23) have shown that the VIPROSEM reliably registers transient states of mood.

Neuropsychological factors. At the end of each intervention phase, neuropsychological deficits were assessed using the following, reliable (15), tests: 1) Categorical Verbal Fluency test; 2) Auditory Visual Comprehension test; 3) Dutch version of the Rey Auditory-Vocal Learning test; 4) Facial Recognition test; 5) Line Biasedness test; 6) Judgment of Line Orientation; 7) Simple Auditory Reaction Time test.

METHODS

Design
Seven stroke patients were treated according to a B-C-B-C design in which the methods N.D.T. and Brunstrom were alternated (Fig. 1). The first treatment phase started five to

days after the onset of the stroke. The rehabilitation method that was applied in the first treatment phase, was randomly assigned to the first patient. For the other six patients, N.D.T. and Brunstrom were alternately used as the first treatment. Each intervention phase lasted five weeks, so that the total duration of the study was twenty-one weeks per patient.

Before initiating the first intervention condition, the patients were assessed by both a neuropsychologist and a neuropsychologist in order to decide whether or not they fulfilled the admission criteria (see Subjects). The neuropsychologist diagnosed the pathophysiological condition of the patient, recorded relevant parameters (e.g., reflex activity, muscle tone, sensitivity, etc.) and, on this basis, selected patients for the study. The neuropsychologist evaluated perceptive deficiencies (e.g., visual inattention, alertness, recognition-deficits and comprehension deficits) of the patients as selected. These assessments were repeated at the end of each treatment phase in order to obtain a broad perspective on individual recovery patients. Every week, walking disability, upper limb functions, ADL and depressive mood and feelings were measured.

After a period of four weeks in the Neurology Ward of the Free University Hospital, patients were either admitted to a rehabilitation clinic (N-V) or returned home (N-3) to be treated three to four times per week in the outpatient's department of the hospital. While in the hospital or on rehabilitation clinic, patients were treated each week, five times. Each treatment session lasted thirty minutes.

Subjects
The seven patients participating in this study, met the following admission criteria: 1) 40 to 80 years of age; 2) suffered a stroke involving an ischaemic infarct in the territory of the middle cerebral artery—as revealed by CT scanning; 3) No Transient Ischaemic Attacks (T IA). Baseline Haemodynamic Deficit (R.I.N.D.), or progressive stroke, i.e., the patients suffered from complete rather than partial stroke; 4) no deficits in memory or understanding; 5) not suffering from complicating medical history such as cardiac or pulmonary disorders; 6) informed consent and sufficient motivation to participate.
sented was that of Basmajan et al. (2) in their analysis of upper limb function.

Some studies do reveal significant differences in efficiency between neurological exercise therapies but, generally, these differences have to do with rather specific treatment effects with minimal functional impact. Mulder (21), for example, found EMDM feed- forward therapy to be more effective than N.D.T. in terms of EMDM activity of the trained muscles (i.e., the dorsal flexors of the foot), but not in terms of either the range of motion (i.e., dorsal and plantar flexion of the ankle) or walking speed.

It has been argued repeatedly (e.g., 1, 2) that the heterogeneity of the stroke population is the major confounding factor in intervention studies. In general, detailed knowledge of stroke patient characteristics and their individual recovery patterns is scanty indeed. A number of authors (e.g., 9) have pleaded for single case experimental designs in which (cf. 14) treatment measures are taken frequently and treatments are alternated within one patient. In this way, it is argued, a better perspective can be obtained on the efficiency of treatment forms and the importance of patient characteristics as major determinants of functional recovery patterns. The present study uses a single case experimental design to compare the effectiveness of N.D.T. and Brunnstrom in the context of functional recovery.

METHODS

Design
Seven stroke patients were treated according to a B-C-B-C design in which the methods N.D.T. and Brunnstrom were alternated (Fig. 1). The first treatment phase started five to

days after the onset of the stroke. The rehabilitation method that was applied in the first treatment phase, was randomly assigned to the first patient. For the other six patients, N.D.T. and Brunnstrom were alternately used as the first treatment. Each intervention phase lasted five weeks, so that the total duration of the study was twenty-one weeks per patient.

Before initiating the first intervention condition, the patients were assessed by both a neurologist and a neuropsychologist in order to decide whether or not they fulfilled the admission criteria (see Subjects). The neurologist diagnosed the pathophysiological condition of the patient, recorded relevant parameters (e.g., reflex activity, muscle tone, sensation, etc.) and, on this basis, selected patients for the study. The neuropsychologist evaluated perceptive deficits (e.g., visual inattention, alienation, recognition-deficits and comprehension deficits) of the patients selected. These assessments were repeated at the end of each treatment phase in order to obtain a broad perspective on individual recovery patterns. Every week, upper limb function, walking disability, and ADL were measured. In addition, occurrence of depressive mood and feelings were measured.

After a period of four to eight weeks in the Neurology Ward of the Free University Hospital, patients were either admitted to a rehabilitation clinic (N=4) or returned home (N=3) to be treated three to four times per week in the outpatient department of the hospital. While in the hospital or the rehabilitation clinic, patients were treated each week-day. Each treatment session lasted thirty minutes.

Subjects
The seven patients participating in this study, met the following admission criteria: 1) 40 to 80 years of age; 2) suffered a stroke involving an ischemic infarct in the territory of the middle cerebral artery—as revealed by CT scanning; 3) No Transient Ischemic Attack (T.I.A.), Basal Ganglia Neurological Deficit (R.I.N.D.), or progressive stroke, i.e., the patients suffered from complete rather than incomplete stroke; 4) no severe deficits in memory or understanding; 5) no complicated medical history such as cardiac or pulmonary disorders; 6) informed consent and sufficient motivation to participate.

During the period in which this intervention-study took place, the middle cerebral artery stroke patients were included in the study—about 3% of the total stroke population admitted to the Neurology Ward of the Free University Hospital. Thus, the sample size was a small and relatively homogeneous subsample of the total population of stroke patients. Furthermore, the patients were tested, however, differ on relevant parameters. Their age range from 40 to 77 years. Five of them had suffered a stroke in the right hemisphere and two in the left.

Treatment conditions
Both N.D.T. and Brunnstrom method are commonly applied forms of physical therapy in the rehabilitation of stroke patients and have been described in detail in the literature. In this study, the approach used in the N.D.T. condition adhered strictly to the principles presented by Davies (5) and the principles based in the book "The Human Fatigue Syndrome" formulated by Brunnstrom (4). Facilitation, or inhibition techniques and instructions for motor behaviour were specified accordingly, as well as the positioning and moving of the patient in bed and in the chair, e.g., lying and sitting positions, sitting up, transfers, etc. Every member of the team of physical therapists, occupational therapist and nurses, acted in accordance with a detailed written protocol based on the abovementioned principles of the therapy involved. Both methods were applied by specially trained therapists.

Outcome
The relative efficacy of the two contrasting forms of physical therapy was evaluated in terms of disability (functional recovery) and validity assessment instruments. Each week, upper limb function, walking disability, and ADL were measured. In addition, occurrence of depressive mood and feelings were assessed.

Upper limb function. After reviewing twenty-seven tests for upper limb function, the Armitage Research Arm Test (ARA-RT), test 18 was chosen because of its high reliability, high validity, and practical applicability. It measures a range of movements involving several hand grips and arm movements. Hand grips (i.e., grasp, grip, lateral prehension, finger-thenar opposition) are evaluated asking the patient to move objects with different shapes, sizes and weights to various places on a specially designed wooden tablet (12). In addition, the hand has to be moved to the mouth and to the top and the back of the head. In this study, two tasks were included in the fourth subset without changing the total score, i.e., an object on the table had to be pushed forward and the arm had to be stretched above the head. In this way, the ARA-RT test is made more sensitive for those stroke patients who hardly show any functional recovery.

The movement assessment is made on a four-point scale: 0 = no movement is possible; 1 = the movement is "partially" performed; 2 = the movement is completely performed, but "abnormally" so; 3 = the movement is "normally" performed. In this study, a "partial" impairment of the right patients was accepted as a task difficulty, but was able to either lift the hand with the object off the table (subtasks 1, 2, and 3) and to push the object forward/flick the hand off the table (subtask 4) "a normal performance implied that the patient complet-
Fig. 2A. The results of one patient on a number of gait parameters under the instruction "WALK AS FAST AS POSSIBLE." Results are displayed with respect to walking speed (1), stride length (2), step frequency (3) and symmetry ratio (4).

Fig. 2B. The results of one patient on a number of gait parameters under the instruction "WALK AS COMFORT-ABLY AS POSSIBLE." (See Fig. 2A for additional information.)

RESULTS

**Differences in efficacy**

After applying lag sequential analysis to the data derived from each individual patient, a "lag 1" trend was found for all parameters studied. In most cases, it was a logistic function (producing sigmoidal patterns or S-shaped curves), but in some cases, an exponential function, that fitted the individual recovery patterns adequately.

In addition to this secular trend, visual inspection of the data revealed, for one patient only, a possible intervention effect on a few gait parameters (see Figs. 2A1-4 and B1-4); during the Brunnstrom intervention phases, more progress in "recovery" occurred in comparison to the N.D.T. intervention phases. For this patient, the logistic function fitted the data most adequately. After analysing the residuals of this patient with the Mann-Whitney U test, more progress in speed of walking was demonstrated during the Brunnstrom intervention phases in comparison to the N.D.T. intervention phases. This result, however, was only found for comfortable speed of walking (see Fig. 2B1). Although fast walking speed, stride length during fast walking speed, and step frequency also showed a comparable recovery pattern (see Fig. 2A1, Fig. 2A2 and B3), no significant differences in efficacy were found for these parameters. The other gait parameters, upper extremity function and ADL showed no significant differences either.

**Recovery patterns**

The individual recovery patterns of the seven stroke patients are presented for maximum walking speed (Fig. 3), and upper extremity function (Fig. 4). For both of these variables, statistically significant correlations were found between, on the one hand, the week post stroke in which patients showed first signs of functional recovery (T) and, on the other, the amount of recovery after twenty weeks (4). The Spearman Rank Correlation Coefficients were $r=0.80$ for maximum walking speed and $r=0.95$ for upper extremity function. Parameter $T$ was defined for walking velocity as the first week the patient was able to walk independently, and for upper extremity function as the first week in which the patient was able to partially perform at least one motor task. The results indicate that $T$ is an important predictor for...
Data analysis

Data analysis in single case experimental design requires several steps (19). Before differential effects between two treatment forms can be analysed statistically, one has to ascertain that no general trends are inherent in the data. Wherever there is such a trend within the data, later data points can be predicted on the basis of former ones, i.e., the data points are "serially dependent". Since traditional statistical tests rely on the assumption that (the residuals of) the data points are independent, trends must be either removed before proceeding with further analysis (e.g., by using first order differences), or modelled and controlled for (e.g., by time series analysis).

In this study, lag sequential analysis was used in order to detect serial dependency within the data points. If a secular trend was manifest within the data derived from a specific patient, linear and non-linear regression analysis was performed in order to construct a model for this trend leaving a minimum of unexplained variance. Differences in efficacy were calculated by applying the Mann-Whitney U test to the residuals.

Fig. 2A. The results of one patient on a number of gait parameters under the instruction "WALK AS FAST AS POSSIBLE". Results are displayed with respect to walking speed (1), stride length (2), stride frequency (3) and symmetry ratio (4). During the B-phases the Brunnstrom method was applied, during the C-phases the N.D.T. method. Linear regression analysis was applied to each phase separately.

Results

Statistical relations between variables were estimated with the Spearman Rank Correlation test. For all tests 0.05 was chosen as the level of significance.

Fig. 2B. The results of one patient on a number of gait parameters under the instruction "WALK AS COMFORT-ABLY AS POSSIBLE". (See Fig. 2A for additional information.)

Recovery patterns

The individual recovery patterns of the seven stroke patients are presented for maximum walking speed (Fig. 3), and upper extremity function (Fig. 4). For both of these variables, statistically significant correlations were found between, on the one hand, the week post stroke in which patients showed first signs of functional recovery (T) and, on the other, the amount of recovery after twenty weeks (A). The Spearman Rank Correlation Coefficient were r=0.80 for maximum walking speed and r=0.95 for upper extremity function. Parameter T was defined for walking velocity as the first week the patient was able to walk independently, and for upper extremity function as the first week in which the patient was able to partially perform at least one motor task. The results indicate that T is an important predictor for
the end condition of the stroke patient after twenty weeks.
Neither within the individual patients, nor in the (rather small) sample of the seven patients taken together, could statistically significant correlations be found between the neuropsychological factors studied and functional recovery.

DISCUSSION

The results of this intervention study showed no clear evidence of an efficiency between the methods N.D.T. and Brunstrom within the framework of functional recovery. For only one stroke patient, were significant differences (in favour of Brunstrom) found, that is, in terms of one parameter only, i.e., comfortable speed of walking. It should be noticed that walking speed is specifically trained in the Brunstrom method; it may be therefore, that we are here confronted with just another example of therapy producing its own intrinsic effects. In this respect, the findings of this study correspond to the results of previous studies involving either N.D.T. or Brunstrom which generally showed no differences in efficacy between 'neurological' exercise therapies (cf., 2, 6, 16, 17, 22), or, at best, specific treatment effects (e.g., 21).

The general lack of differences in efficacy between N.D.T. and the Brunstrom method could, of course, have been due to the fact that our B-C-B-C design did not allow for the application of one treatment form during a longer period; longer treatment phases may still induce differences in efficacy to become visible. However, the general recovery process which became apparent, renders, in our opinion, the confounding influence of this factor highly improbable. Firstly, a high correlation was found between the number of the week in which a patient showed first signs of functional recovery (T), and the final amount of functional recovery after twenty weeks (A). Secondly, the individual recovery patterns display a general sigmoidal or exponential trend with hardly any systematic treatment-induced changes in the residuals.

In a number of studies (cf., 13, 24), several factors have been proposed as being predictive of the rehabilitation outcome of stroke patients, e.g., perceptual deficits, poor motivation, urinary/facility incontinence, etc. Moreover, linear functions, incorporating one, or several, of these factors have been formulated in order to render long term prognosis feasible (e.g., 2, 25). The present study reveals the fact that the later post stroke functional recovery starts, the less functional recovery will occur. This result confirms other studies on the recovery process of stroke patients (e.g., 8, 24, 25).

The high correlations found, suggest that a prognostic relation (e.g., an exponential or linear function) exists between T and A, on the basis of which the end condition after twenty weeks (A) can be adequately predicted as soon as the patient shows signs of functional recovery (T). So far, we have been unable to find significant relationships between symptoms immediately after stroke and final outcome—possibly due to lack of sensitivity of the assessment instruments used.

In a number of studies, recovery patterns over time have been displayed graphically (e.g., 8, 24, 25). Only Mrazek et al. (20) have analysed the individual recovery patterns for walking speed over time as an exponential function. Our study suggests that an S-shaped, or a sigmoidal curve, may fit the individual data better than a linear or an exponential trend. The sigmoidal trend is more striking for upper extremity function than for speed of walking (see Figs. 3 and 4).

It remains to be seen whether or not a logistic function, producing sigmoidal curves, will be better in predicting the pattern of recovery and the final outcome than a linear or an exponential function.

So far, both the week post stroke in which the patient shows first signs of functional recovery and the mathematical function used to model recovery patterns, appear to depend very much on the assessment instruments used. The equations presented in the literature have prognostic or descriptive rather than explanatory power. The advantage of even a prognostic or descriptive model is, however, that a better perspective on the heterogeneity of the stroke population can be obtained, so that relevant subpopulations can be distinguished, on the basis of which further intervention studies can be optimized.

Single case experimental methodology is frequently used in the evaluation of intervention strategies in the rehabilitation of stroke patients. By locating experimental control within one patient, rather than between groups of patients, one tries to cope with the heterogeneity of the stroke population. Of course, single subject designs do not solve all the problems arising from heterogeneity. In particular, generalizing treatment effects requires replication, and the methodological framework to establish generalizability is still in infancy.

It is true that an alternating single case experimental design may create a major problem, i.e., not allowing for long term cumulative effects of a treatment. Nevertheless, an advantage of single case experimental methodology is that the patient is repeatedly measured over time, i.e., at least three times in each phase.

In this way, it is not only possible to record differences in efficacy of treatments, but also to obtain more insight into the general recovery patterns of stroke patients.

A still better insight on recovery patterns would be obtained by providing no intervention at all. For ethical reasons, however, this would, in our opinion, be very difficult to implement.

Registering inter and intra-subject variability by means of longitudinal studies enables one to distinguish relevant subpopulations of stroke patients and to pinpoint patterns of functional recovery, a possibility which is important to rehabilitation practice as well as to designing intervention studies.

REFERENCES

the end condition of the stroke patient after twenty weeks.

Neither within the individual patients, nor in the (rather small) sample of the seven patients taken together, could statistically significant correlations be found between the neuropsychological factors studied and functional recovery.

DISCUSSION

The results of this intervention study showed no clear differences in the efficiency between the methods N.D.T. and Brunnstrom within the framework of functional recovery. For only one stroke patient, were significant differences (in favour of Brunnstrom) found, that is, in terms of one parameter only, i.e., comfortable speed of walking. It should be noticed that walking speed is specifically trained in the Brunnstrom method; it may be therefore, that we are here confronted with just another example of therapy producing its own intrinsic effects. In this respect, the findings of this study correspond to the results of previous studies involving either N.D.T. or Brunnstrom which generally showed no differences in efficiency between 'neurological' exercise therapies (cf., 2, 6, 16, 17, 22), or, at best, specific treatment effects (e.g., 21).

The general lack of differences in efficiency between N.D.T. and the Brunnstrom method could, of course, have been due to the fact that our B-C-B-C design did not allow for the application of one treatment form during a longer period. longer treatment phases may still induce differences in efficiency to become visible. However, the general recovery process which became apparent, renders, in our opinion, the confounding influence of this factor highly improbable. Firstly, a high correlation was found between the number of the week in which a patient showed first signs of functional

The functional recovery of stroke

ACKNOWLEDGEMENTS

We thank the physical therapists and the occupational therapists of the Free University Hospital and the Rehabilitation Centre Overtoem for their support in this study. We are especially grateful to Mrs. G. S. M. Bruurse-Leendertse, Mrs. E. den Brink-Heckmann, Mrs. I. A. I. Berken-Boym, Mrs. C. Curnp, P. G. Colman, D. van den Dool, Mrs. M. J. Eversen, Mrs. H. J. J. Kuipers, G. Kukken, and Mrs. M. Manders, Mrs. A. A. Schilder, Mrs. E. F. Van Tinter, J. Vosk, and H. T. A. A. Wiling for their active and stimulating participation. Furthermore, we thank the Department of Rehabilitation and the Department of Psychiatry Consultancy of the Free University Hospital for their allowing us to use their equipment during assessments.

REFERENCES


A complete reference list can be sent upon request.

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TESTING DAILY FUNCTIONS POST-STROKE WITH STANDARDIZED PRACTICAL EQUIPMENT

Bepiga Lindmark, Elisabeth Hamrin and Kristina Törnqvist

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METHOD

Subjects
All acutely ill stroke patients who had been admitted to four general medical wards at the University Hospital in Uppsala during a period of five months in 1984 and eight months in 1985, and who had survived and were tested three months and one year after the stroke, were enrolled in the study. Three months after the stroke 210 patients (75%) had survived and 207 patients (median age 74 years, range 30–96 years; 109 men and 98 women) were tested. At one year 191 (68%) had survived and 183 patients (median age 74, range 30–92; 101 men and 82 women) were tested. At the three-month follow-up three patients declined to participate, and at the one-year follow-up eight patients.

Three-month and one-year follow-ups
All patients were visited by one or two members of the project group three months and one year after the stroke. Most of the patients were visited in their homes, and the others in hospitals for long-term care, at day-care centers or in old people’s homes.

At these visits the patients were interviewed with the help of a structured chart by Hamrin concerning different instrumental activities of daily living, such as household activities, locomotion, psychosocial functions and intellectual activities (5). The primary ADL functions were assessed with the aid of the Activity Index constructed by Hamrin & Wohlin (5). With this index mental capacity, motor activity (mobility) and six activities of daily living were assessed. The motor functions were evaluated on the basis of a chart, developed by Lindmark (4) within the study for assessment of motor capacity. With the help of the motor chart the motor functions of both sides of the patient were assessed. The domain investigated were ability to perform active movements, coordination, gross mobility, balance, sensation, joint pain and passive range of motion. The results of the interviews and the functional tests have been reported elsewhere (5).

Besides the above-mentioned evaluations, the patients were also asked to perform a number of practical tasks with use of the SPE constructed by one of the authors (Törnqvist).

Practical functional test with SPE
The Standardized Practical Equipment test included the following practical tasks which the patients were asked to perform. They could use either one or both hands. The important thing was that the patient was able to carry out the task.

1. To open and close the patient’s own front door.